DOCUMENT RESUME

ED 280 981 CE 046 774

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TITLE Curriculum Costs: Vocational Subjects.
INSTITUTION London Univ. (England). Inst. of Education.
PUB DATE May 86
NOTE 14p.; Paper presented at the Vocationalising Education Conference (London, England, May 7-9, 1986).
PUB TYPE Speeches/Conference Papers (150) -- Viewpoints (120)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cost Effectiveness; *Costs; Developed Nations; Developing Nations; *Educational Finance; *Educational Research; *Foreign Countries; Postsecondary Education; Secondary Education; *Vocational Education
IDENTIFIERS Colombia; Kenya; Tanzania; United Kingdom

ABSTRACT

To establish a definition of costs in education, a "concept map" is established to which inevitable questions of inclusion and exclusion can be addressed. A specific case, namely the costs of practical/vocational subjects, is then presented. It also includes a profile of benefits, since with regard to vocational education, much more than with other curriculum subjects, the issue of whether it is at all possible to discuss costs without reference to putative benefits demands consideration. The second part of the paper aims to obtain guidance from the published literature on the costs and benefits of practical/vocational subjects relative to other curricula. This research include studies on the direct recurrent expenditures incurred by society, a study on costs in British further education, a cost-benefit analysis of vocational education in New York City high schools, a comparison of costs of vocational and comprehensive secondary education and the labor market success of the two types of schools, a study of the differential costs of curricula in junior colleges, studies of the costs of vocational education in Thailand, a study of cost structures of secondary schooling in Tanzania and Colombia, and the Swedish International Development Authority study of practical subjects. Five conclusions regarding costing in education in general and costing of vocational subjects in particular are offered. (YLB)

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VOCATIONALISING EDUCATION CONFERENCE

7-9 May, 1986

CURRICULUM COSTS: VOCATIONAL SUBJECTS

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CURRICULUM COSTS : VOCATIONAL SUBJECTS

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A PAPER PRESENTED AT THE VOCATIONALISING EDUCATION CONFERENCE

DICE, UNIVERSITY OF LONDON INSTITUTE OF EDUCATION.

7 - 9 MAY, 1986

INTRODUCTION

It is necessary to establish a definition of costs, a "concept map" to which inevitable questions of inclusion and exclusion can be addressed. However, much more than with other curricular subjects the issue of whether it is at all possible to discuss COSTS without reference to putative BENEFITS demands consideration. A profile of benefits is therefore described. The first part of the paper consists then of a framework for appraising the costs of practical/vocational subjects. The second part aims to obtain guidance from the published literature on the costs (and benefits) of practical/vocational subjects relative to other curricula.

PART I A CONCEPT MAP OF COSTS IN EDUCATION

Conceptual Framework (1)

All real resources used in education could in principle be allocated to other uses. Hence, the costs of education - as of other economic activities - amount to what is sacrificed with respect to the best alternative use of those resources used in education. Measurement of costs implies that all the alternative uses of the real resources can be both imagined and valued (a price tag attached to them). If this ideal of the economist is accepted, it is immediately clear that all of the true costs of education do not appear in, for instance, budget statements. An example of such an omission occurs when in courses, offered by technical colleges and some universities and purporting to be directly related to raising productivity in industry and commerce, the convention is to price the time of the students as zero. A statement of the accounts of such institutions will include direct costs of labour, buildings, plant, equipment. Further rumaging in the byeways of official statistics would unearth other costs such as transfer payments (allowances paid to students) and extra living costs associated with being in the student role. Students' time is, however, 'free'. Yet, time and again in studies of educational costs, the opportunity cost of students' time, calculated as the income foregone by students during study, has been reported as high as or higher than the direct costs of education, Schultz (1961), Selby Smith (1970, p70-71), Judy (1971, p46-53)

Two further distinctions are necessary before sketching a useable map of costs. First, current or recurrent expenditure is made on goods and services that are used up and/or have to be bought regularly. Capital expenditure is made on goods that last more than one year, and possibly as long as 60 years; renewal is therefore sporadic. Second, budget and account statements are meant usually to render a form of public accountability and, therefore, the costs identified in such statements are some part of social costs. Social costs are those that are borne as a result of the social decision to have some education activity and such costs fall upon society. Private costs are borne by students or their families as a result of and in return for education.

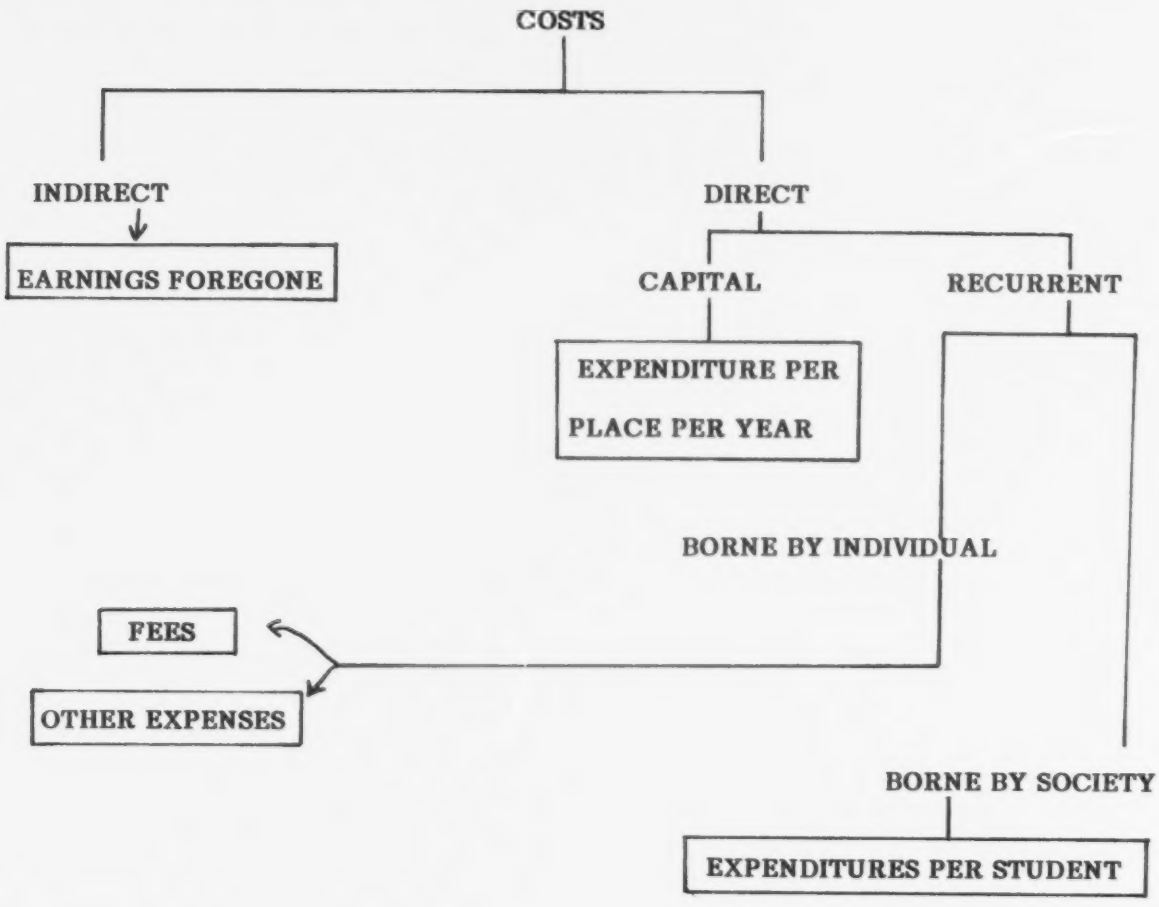
Figure 1 attempts to map the broad field of costs of education.

Putting price tags on costs.

Indirect Costs : If remarks are limited to students on practical/vocational courses the convention is to assume that such students forego a certain proportion of the income earned by their peers in work adjusted for

Figure 1

Concept Map of Costs



SOCIAL COSTS = EARNINGS FOREGONE + EXPENDITURE PER PLACE PER YEAR + OTHER EXPENSES + EXPENDITURES PER STUDENT INCLUDING FEES

PRIVATE COSTS = EARNINGS FOREGONE + FEES + OTHER EXPENSES

unemployment (Schultz, 1960). There are problems with the validity of such estimates : for instance, what happens to wage rates when one-time students are released to the labour market? which unemployment rate to use?

Direct costs : The most straightforward element in costing in principle, if not in practice, is to measure recurrent expenditure. Outturns of expenditure are normally available for levels of aggregation above that of the individual institution. Where institutional records are available, allocation of expenditure to functions eg teaching and administration and organisational units such as departments remains to be done by the cost analyst. Hence curriculum costs are seldom given. In a paper, prepared for a recent conference entitled Economics and Educational Management, if was reported that " ..... we need ultimately to examine the combined impact of separate resource allocation decisions on the costs of the curriculum that schools provide ..... Curriculum costing studies of these kinds are relatively rare." (Simkins, 1986).

Those recurrent costs borne by individuals such as school transport, special clothing, books, extra food costs are not routinely available. Household survey data and research studies do, from time to time, produce such data. The alternative route to their measurement is to impute them on the basis of their size relative to income foregone or direct social recurrent expenditure. Fees present a more manageable component since scale charges are normally available for both private and public sectors of education.

Direct costs, capital components. Even if a capital sum is 'spent' in one year it would clearly be inappropriate to include the sum spent in that year, thereby implying the real resources 'free' use in future years. An annualized capital expenditure is necessary. To do this, account must be taken of the expected lifetime of the real resource - 50 or 60 years for a school building in UK but only 20 years in, for example, a harsh African climate - and an estimate made of the interest 'lost' by having purchased the real capital resource instead of, say, investing the money in the best (and safest) bond market. The annualized expenditure can be regarded as the annual rental value; what one would pay if one had to lease the building or equipment rather than buy it outright. Costing of capital is obviously sensitive to interest rates chosen for the best alternative investment. (1)

Conceptual Framework (2)

In a paper on the costs of education it would be perfectly legitimate to proceed to the specific case, namely the costs of practical/vocation subjects. Various reasons can be given for costing in education.

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(1) In UK school buildings and those of local authority colleges are not bought outright, since the capital sum is normally borrowed on the local authority bond market. Thus the annual charges on loans can be used as a proxy for annualized capital expenditure.

Reasons for Costing in Education

.....1. to describe fully the provison and allocation of resources in an education system:

.....2. to note differences in unit costs and highlight decisions that lead to those differences:

.....3. to alert decision-makers to cost consequences of their decisions:

.....4. to undertake production function studies, relating resource inputs to the outputs of education:

.....5. to carry out cost-benefit and cost-effectiveness studies for alternative programmes.

It may seem naive, but the strongest reason, to me, is the first reason, namely, simply to describe fully the resources allocated. (No one would seriously quibble with a manager in industry who set about costing his marketing operation.) But, and it is a big but, costs have costs. Curriculum costing may require, at least at present, some additional justification.

As Levin (1981) argues; "any educational program that purports to improve the labor market success of its students represents a prime candidate for cost-benefit analysis because the benefits of such programs can be readily assessed in monetary terms in order to make them comparable with costs."

Profile of benefits to vocational education.

The dominant element in the profile of benefits to vocational education is that of increased lifetime earnings of the successful participants in vocational education programmes. The reasoning is that the benefits of the programme consist of the increased output directly attributable to the investment in the vocational programme. One of the sacred canons of human capital theory holds that the output gains can be measured tolerably well by summing the lifetime earnings differentials (suitably discounted) of students who have and have not received the programme under investigation. There is a vast library of doctoral theses and other researchers applying this approach to education, mainly at the level of stages of education eg. primary against secondary. Psacharopoulos (1973, 1981) is the doyen of this approach and fairly convincing patterns of findings do emerge.

Other claimants to being a benefit to specifically vocational education programmes are a) reduction of aggregate unemployment below the rates that would otherwise have existed; redistribution of income to low-income groups; (c) external benefits such as lower incidences of social deviation. In the literature on cost-benefit approaches in education it is not usual to find price tags put on these last three aspects of benefits.

To sum up this final part of the paper, two points need to be highlighted. First, the concept of cost and its meaning to the various interested parties when costs are discussed in education is not commonsensical. The concept map shows the main features of a still largely unsurveyed land. Second, while the process of costing in education can be justified in its own right, when attention is focussed on vocational education, for which many would claim there are or ought to be measurable returns, an additional pretext for costing is to hand. We turn now to what can be gleaned from the literature on curriculum costs to examine it within the theoretical framework of Part I.

PART II OBTAINING GUIDANCE ON THE COSTS OF VOCATIONAL SUBJECTS

One must bemoan the paucity of published and easily accessible studies of both curriculum costs and of their sub-set, practical/vocational subjects. There is a faint possibility that somewhere administrators in education beaver away doing just such studies as a routine part of their work. The near ubiquity of computerbased accounting in the education systems of the developed world certainly makes costing of subjects an administrative possibility whereas, before computers, such a task was for the persistent researcher! An ERIC search brought forth a crop of possibilities which, in the main, on follow-up were irrelevant.* The Unesco organisation, The International Institute for Educational Planning, did more school cost studies than any other organisation during the tenure of the last director, an economist. Only one such study, as yet not available in English, has been done on the costs of curriculum including vocational subjects (Tibi 1986).

Some guidelines for curriculum costing. In a study of school subjects the present writer focussed on the direct recurrent expenditures incurred by society (Cumming, 1971). A distinction that proved worthwhile was that between staffing costs of subjects - covering expenditures on teaching staff only - and teaching costs - covering staffing costs plus all other expenditure unambiguously allocable to the teaching of a particular subject. Three separate unit costs were calculated and the resulting comparison of subjects was significantly affected by the choice of unit (cost per pupil, cost per pupil-period and cost per teaching group or class). The cost per pupil-period, which is the product of pupils and the time for which a subject is studied, was concluded to be the most robust unit for comparison. Using the pupil-period as the divisor, the unit costs of teaching English in 12 secondary schools varied by the order of 500%. (Cumming ibid, p.106). Classics turned out, on average, to be the most expensive subject at more than 200% greater than English. The unit teaching costs of technical subjects were less than half those of classics but 50% above those of English. No attempt was made in those studies to scale the peaks of indirect costs and capital costs. A later attempt, Cumming et al (1972), to apply the same curricular costing methodology to courses in further education colleges revealed that the unit costs of departments (the loci of courses) varied as much across colleges as they did between different courses. In both schools and colleges unit costs are particularly sensitive to even small changes in class size.

A second study of British further education (Selby Smith, 1970) did go beyond

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* The draft version of this paper may be amended when a second trawl of ERIC sources is reviewed.

the above Scottish studies by including (a) direct capital charges (based on allocating loan charges to departments) and (b) imputing the costs of students' time. Selby Smith goes beyond the costing of courses in calculating partial (benefit-cost) ratios using discounted median values of future earnings (Selby Smith, ibid p.130).

Taussig (1968) did a cost-benefit analysis of vocational education in New York City high schools. He found that vocational education did not increase "the market productivity of the graduates of the vocational high schools." He goes on to conclude that the unremarkable market productivity was achieved despite "the large incremental costs shown to be devoted to vocational training relative to the alternative high school programs." He found that unit recurrent 'teaching' costs in vocational high schools and academic high schools were in the ratio of 1.66:1 while overall institutional unit recurrent costs were in the ratio of 1.43:1. (He adopts a short-cut method for capital costs, assuming those would be 22% of recurrent costs!) Notice, Taussig does not cost vocational subjects, merely the institutions with a 'bias' towards vocational education. His study is similar in shape - at least in the costing element - to those of Hinchliffe (1983) and Tibi (1986), see below. He does not show that 'vocational training' has high incremental costs relative to other curricula. Logically the possibility exists that at least some of the incremental costs in the vocational high schools were due to the other curricular elements in these schools.

In another and more elaborate study, Hu et al (1971) compared the costs of vocational and comprehensive secondary education and the labour market successes of the two types of high school in three American cities. In contrast to Taussig, they concluded that not only were the monetary returns of the vocational graduates higher than those of comprehensive graduates but also for one city, using three measures of comparison, the returns greatly exceeded the costs. Unfortunately the treatment of costs in the study is relegated to 2 pages compared with 18 pages of the benefits. What is clear is that Hu and his colleagues did not undertake the costing of the schools themselves, but relied instead on data from the school districts. The average unit recurrent expenditures of the two types of high school were in the ratio 1.44:1 (vocational : comprehensive). Elsewhere Levin (1981) quotes Hu and Stromsdorfer (1979) as reporting that vocational curricula show unit costs of from two to five times as much as other curricula.

A third American investigation concentrated on the differential costs of curricula in junior colleges, Warren et al (1976). In an effort to untangle the costs of the component courses of curricula, Warren et al compared costs of all baccalaureate and occupational curricula relative to an invention of their own - the Baccalaureate Curricular Cost Base (BCCB) for each institution studied. The BCCB is the weighted average of the annual costs of educating a student in three broad baccalaureate areas viz business, education and liberal arts. They found that a majority of courses in highly specialised fields in both the occupational and baccalaureate categories were more expensive than courses represented in the BCCB. For instance, "health occupations curricula cost on the average approximately 1.8 times as much per student as curricula comprising the BCCB, both technical occupations and trade and industrial occupations curricula cost approximately 1.5 times as much".

A novel feature of the study is the notion of equipment centeredness, curricula that require major investments in instructional equipment. High equipment centeredness - calculated as the depreciation of instructional equipment divided by salary expenditures for each field of instruction - explained some of the high relative costs for fields of instruction.

Tibi (1986) has been studying the costs of vocational education in Thailand. He writes "..... it has been difficult to get costs by specific field of study because of the diversity of fields and levels of education or training within the same school." * What he can report is the unit costs (recurrent, direct and social only) according to types (biases) of each institution. Recurrent costs per student are highest in Agricultural Colleges, followed by those in Technical Colleges and then by those in so-called Professional Colleges, where arts and crafts are taught. (The ratios were 1.96:1.54:1) More interesting are Tibi's observations of the relative labour intensiveness of the colleges. In the Agricultural Colleges expenditures on personnel account for 39% of total recurrent expenditure : in Technical Colleges they are 55% and in Professional Colleges they are 58%.

It is a cliché of curriculum costing that 'practical' subjects are more expensive because of the kind of resources employed. The problem is that seldom is there quantification of the resource gap. Moreover, it is necessary to state that other things must be equal for the obvious to hold. (Recall the finding that Classics was the most expensive subject in a Scottish authority's schools.)

To conclude this review of the literature in a search for guidance on the costs of vocational subjects we turn to two recent studies which have been the subject of attention at this conference. Hinchliffe's work, part of the DiSCus project, concerns cost structures of secondary schooling in Tanzania and Colombia, Hinchliffe (1983). Like the studies of Tibi, Taussig and Hu et al, Hinchliffe costs schools with biases rather than costs separate subjects. Hinchliffe's approach is to cost directly 4 categories of school in Tanzania and 6 in Colombia. All the cost components in the cost concept map are included. Earnings foregone are established by a novel way. This indirect cost is identical for all the 4 biases in Tanzania : while in Colombia indirect costs do not vary by more than 17% between the highest (the academic bias) and the lowest (the commercial bias). The intriguing aspect of Hinchliffe's results is the apparent proximity of costs whatever the bias. In Tanzania, academic biased schools are cheapest. Total annual unit recurrent costs are 19% higher in agricultural-biased schools, 13% higher in technical-biased schools, and 9% higher in commerce-biased schools compared with the academic schools. However, in terms of total unit social costs the differentials almost disappear. Thus, the total unit social costs are 2%, 3% and 4% higher in the commerce-, technical-, and agricultural-biased schools respectively than in the academic schools. The data for Colombia are complicated by a comparison of World Bank project schools - INEMs** - and other schools. The INEMs combine academic and pre-vocational curricula and include several pre-vocational tracks. Within INEMs, variation in unit costs between tracks are very small. Hinchliffe remarks on the finding. '(perhaps) ..... the nature of the problem is such that the methodology is not picking up.' In other words, he was surprised by the results.

A possible explanation of the observed low unit cost variations between

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* Personal communication to the author March 24, 1986

** INEM =Institutos Nacionales de Educacion Diversificada Media.

schools offering apparently different curricula - apart from the obvious one that there really are no great cost differentials - is that real variations in subject costs are damped by (i) costs of subjects that loom larger in the curriculum than the biases eg. maths and language; (ii) common or shared costs of services such as administration, boarding; (iii) random variations caused by staffing ratios and class sizes. Turning that explanation round, the costs of curricula depend on a complex mix of factors.

Finally, attention turns to the SIDA study of practical subjects. For reasons connected with the overall design of the study and the small period of fieldwork (less than 3 weeks actually gathering data) the full rigours of costing, implied in Fig. 1, were not applied. No data on indirect costs were gathered. Nor was any estimate made of direct costs borne by students. Direct costing, using primary sources, was made of capital expenditures and of recurrent expenditures. The former expenditures refer to the 4 industrial education (IE) subjects, while the latter refer to the secondary schools as a whole. The resulting recurrent costs suffer from the same deficiencies as those cost studies of Hinchliffe, amongst others.

In an effort to get at curriculum costs a method based on an 'identikit' timetable for the IE subjects was employed (Cumming et al (1985) p.90-93). The staffing costs of IE, on this method, were approximately twice those of 'talk and chalk' subjects.

The greatest portion of fieldwork was devoted to using payment vouchers to establish capital costs of the SIDA-supported schools. In annualising these costs the imputed interested rate on the capital was set at zero, on the asumption that SIDA, in giving a grant, surrendered the choice of investing in bonds. The effect is to understate the true social costs. (Hinchliffe adopts the same procedure). The cost per place per year is, for a facility costing 750000Ksh to erect, some 940Ksh with zero interest charges, 3600Ksh at 7.5% interest and 4400 Ksh at 10% interest. Unfortunately, data was not available in Kenya for the actual costs of building/equipping schools other than for the IE facilities. Comparisons were, therefore, made between estimated capital costs for a range of facilities-classrooms, science labs etc. and the actual costs of IE subjects. IE is estimated to be more expensive than (i) classroom subjects - by a factor of 5; (ii) other practical subjects - by a factor of 2/2.5. Compared to science, one of the IE subjects is nine times as expensive in terms of initial equipping.

CONCLUSIONS

First, while a fairly rigorous scheme for costing in education can be designed, its full application in the field of curricular costs is seldom achieved. Second, the unit for comparison of costs of one subject or curriculum with another demands attention. These two conclusions would apply equally to any subject of the curriculum. A third conclusion is that a full discussion of the costs of vocational subjects is seldom complete without consideration of the benefits of those subjects. (High costs may be justified by high benefits). Fourth, the complexity of costing individual component subjects of vocational curricula has led investigations to cost 'biases' in curricula. The resulting differential costs of various biases may distort the true cost differences of component subjects. In calculating the costs of biases the weighting of the component subjects in the curricula must be reflected in the cost

analysis, Warren et al (1976 pp 60-62). Fifth, where costs of vocational/practical subjects can be compared to other subjects in the curriculum they are likely, other things being equal, to be more expensive in terms of costs per student-hour because of (1) the higher capital intensity/lower labour intensiveness of practical subjects (2) lower average 'norm' class size for pedagogical and safety reasons (3) lower actual class size because of the 'experimental' nature of subjects, leading to a lack of optimal uptake.

References

Cumming CE (1971) Studies in Educational Costs Edinburgh : Scottish Academic Press

Cumming CE, Keenan K & Wilson TR (1972) College Costs : The First Part of the Report of the Further Education Resources Project Glasgow : Glasgow University

Cumming CE, Davies M, Lillis K & Nyagah B (1985) Practical Subjects in Kenyan Academic Secondary Schools Stockholm : SIDA Education Division Documents No 22

Hinchliffe K (1983) Cost Structures of Secondary Schooling in Tanzania and Colombia (A DiSCus Working Party) Washington, Education Department, The World Bank.

Hu T, Lee ML & Stromsdorfer EW (1971) Economic Returns to Vocational and Comprehensive High School Graduates. Journal of Human Resources, Vol 6 pp 25-50

Hu T and Stromsdorfer EW (1979) Cost-benefit analysis of vocational education. In Abramson T etal (Eds). Handbook of vocational education evaluation. Beverly Hills, CA : Sage

Judy RW (1971) Cost and Benefit Study of Post-Secondary Education in Ontario, School Year 1968-69, Toronto : The Queen's Printer

Levin HM (1981) Cost Analysis in Smith NL (Ed) New Techniques for Evaluation : New Perspectives in Evaluation Vol 2, Beverly Hills : Sage

Psacharopoulos G (1973) Returns to Education : An International Comparison Jossey-Bass Elsevier

Psacharopoulos G (1981) Returns to Education : an updated international comparison Comparative Education Vol 17 No 3

Selby Smith C (1970) The Costs of Further Education : A British Analysis, Oxford : Pergamon Press

Simkins T (1986) Economics and The Management of Schools A Paper presented at the conference of the British Educational Management and Administration Society University of Birmingham 24/25 April 1986

Schultz TW (1960) Capital formation by education, Journal of Political Economy Vol 68 pp 571-583

Schultz TW (1961) Investment in human capital, American Economic Review Vol 51 pp 1-17

Taussig MK (1968) An Economic Analysis of Vocational Education in the New York City high schools. Journal of Human Resources Vol 3 (supplement) pp 59-87

Tibi C (1986) Report on Costs of Technical and Vocational Education in Thailand (as yet untitled) Draft mimeo (in French) Paris IEEP

Warren JT Anderson EF and Hardin TL (1976) Differential Costs of Curricula in Illinois Public Junior Colleges : Some Implications for the Future. Research in Higher Education Vol 4 pp 59-67